

## SEQUENCE LISTING

<110> Ema, Hideo  
Nakauchi, Hiromitsu  
Osawa, Mitsujiro

<120> PROTEIN SUSTAINING UNDIFFERENTIATED STEM CELLS

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<140> US 10/507,343

<141> 2002-03-11

<150> PCT/JP02/02265

<151> 2002-03-11

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<170> PatentIn Ver. 2.1

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<210> 14

<211> 1140

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Artificial  
Sequence

<400> 14

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<210> 15

<211> 379

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Artificial  
Sequence

<400> 15

Met	Ala	Arg	Arg	Arg	Ala	Phe	Pro	Ala	Phe	Ala	Leu	Arg	Leu	Trp	Ser	1	5	10	15
Ile	Leu	Pro	Cys	Leu	Leu	Leu	Leu	Arg	Ala	Asp	Ala	Gly	Gln	Pro	Pro	20	25	30	
Glu	Glu	Ser	Leu	Tyr	Leu	Trp	Ile	Asp	Ala	His	Gln	Ala	Arg	Val	Leu	35	40	45	
Ile	Gly	Phe	Glu	Glu	Asp	Leu	Leu	Ile	Val	Ser	Glu	Gly	Lys	Met	Ala	50	55	60	
Pro	Phe	Thr	His	Asp	Phe	Arg	Lys	Ala	Gln	Gln	Arg	Met	Pro	Ala	Ile	65	70	75	80
Pro	Val	Asn	Ile	His	Ser	Met	Asn	Phe	Thr	Trp	Gln	Ala	Ala	Gly	Gln	85	90	95	
Ala	Glu	Tyr	Phe	Tyr	Glu	Phe	Leu	Ser	Leu	Arg	Ser	Leu	Asp	Lys	Gly	100	105	110	
Ile	Met	Ala	Asp	Pro	Thr	Val	Asn	Val	Pro	Leu	Leu	Gly	Thr	Val	Pro	115	120	125	
His	Lys	Ala	Ser	Val	Val	Gln	Val	Gly	Phe	Pro	Cys	Leu	Gly	Lys	Gln	130	135	140	
Asp	Gly	Val	Ala	Ala	Phe	Glu	Val	Asn	Val	Ile	Val	Met	Asn	Ser	Glu	145	150	155	160
Gly	Asn	Thr	Ile	Leu	Arg	Thr	Pro	Gln	Asn	Ala	Ile	Phe	Phe	Lys	Thr	165	170	175	
Cys	Gln	Gln	Ala	Glu	Cys	Pro	Gly	Gly	Cys	Arg	Asn	Gly	Gly	Phe	Cys	180	185	190	
Asn	Glu	Arg	Arg	Val	Cys	Glu	Cys	Pro	Asp	Gly	Phe	Tyr	Gly	Pro	His	195	200	205	
Cys	Glu	Lys	Ala	Leu	Cys	Ile	Pro	Arg	Cys	Met	Asn	Gly	Gly	Leu	Cys	210	215	220	
Val	Thr	Pro	Gly	Phe	Cys	Ile	Cys	Pro	Pro	Gly	Phe	Tyr	Gly	Val	Asn	225	230	235	240
Cys	Asp	Lys	Ala	Asn	Cys	Ser	Thr	Thr	Cys	Phe	Asn	Gly	Gly	Thr	Cys	245	250	255	
Phe	Tyr	Pro	Gly	Lys	Cys	Ile	Cys	Pro	Pro	Gly	Leu	Glu	Gly	Glu	Gln	260	265	270	

Cys Glu Leu Ser Lys Cys Pro Gln Pro Cys Arg Asn Gly Gly Lys Cys  
275 280 285

Ile Gly Lys Ser Lys Cys Lys Cys Pro Lys Gly Tyr Gln Gly Asp Leu  
290 295 300

Cys Ser Lys Pro Val Cys Glu Pro Gly Cys Gly Ala His Gly Thr Cys  
305 310 315 320

His Glu Pro Asn Lys Cys Gln Cys Arg Glu Gly Trp His Gly Arg His  
325 330 335

Cys Asn Lys Arg Tyr Gly Ala Ser Leu Met His Ala Pro Arg Pro Ala  
340 345 350

Gly Ala Gly Leu Glu Arg His Thr Pro Ser Leu Lys Lys Ala Glu Asp  
355 360 365

Arg Arg Asp Pro Pro Glu Ser Asn Tyr Ile Trp  
370 375

<210> 16

<211> 1140

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Artificial  
Sequence

<400> 16

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<210> 17  
 <211> 379  
 <212> PRT  
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Artificial  
 Sequence

<400> 17

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Ile	Leu	Pro	Cys	Leu	Leu	Leu	Leu	Arg	Ala	Asp	Ala	Gly	Gln	Pro	Pro	20	25	30	
Glu	Glu	Ser	Leu	Tyr	Leu	Trp	Ile	Asp	Ala	His	Gln	Ala	Arg	Val	Leu	35	40	45	
Ile	Gly	Phe	Glu	Glu	Asp	Ile	Leu	Ile	Val	Ser	Glu	Gly	Lys	Met	Ala	50	55	60	
Pro	Phe	Thr	His	Asp	Phe	Arg	Lys	Ala	Gln	Gln	Arg	Met	Pro	Ala	Ile	65	70	75	80
Pro	Val	Asn	Ile	His	Ser	Met	Asn	Phe	Thr	Trp	Gln	Ala	Ala	Gly	Gln	85	90	95	
Ala	Glu	Tyr	Phe	Tyr	Glu	Phe	Leu	Ser	Leu	Arg	Ser	Ile	Asp	Lys	Gly	100	105	110	
Ile	Met	Ala	Asp	Pro	Thr	Val	Asn	Val	Pro	Leu	Leu	Gly	Thr	Val	Pro	115	120	125	
His	Lys	Ala	Ser	Val	Val	Gln	Val	Gly	Phe	Pro	Cys	Leu	Gly	Lys	Gln	130	135	140	
Asp	Gly	Val	Ala	Ala	Phe	Glu	Val	Asn	Val	Ile	Val	Met	Asn	Ser	Glu	145	150	155	160
Gly	Asn	Thr	Ile	Leu	Arg	Thr	Pro	Gln	Asn	Ala	Ile	Phe	Phe	Lys	Thr	165	170	175	
Cys	Gln	Gln	Ala	Glu	Cys	Pro	Gly	Gly	Cys	Arg	Asn	Gly	Gly	Phe	Cys	180	185	190	
Asn	Glu	Arg	Arg	Val	Cys	Glu	Cys	Pro	Asp	Gly	Phe	Tyr	Gly	Pro	His	195	200	205	
Cys	Glu	Lys	Ala	Leu	Cys	Ile	Pro	Arg	Cys	Met	Asn	Gly	Gly	Leu	Cys	210	215	220	
Val	Thr	Pro	Gly	Phe	Cys	Ile	Cys	Pro	Pro	Gly	Phe	Tyr	Gly	Val	Asn	225	230	235	240





<400>	18						
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<210> 19

<211> 379

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Artificial  
Sequence

<400> 19

Met Ala Arg Arg Arg Ala Phe Pro Ala Phe Ala Leu Arg Leu Trp Ser  
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Ile Leu Pro Cys Leu Leu Leu Leu Arg Ala Asp Ala Gly Gln Pro Pro  
20 25 30

Glu Glu Ser Leu Tyr Leu Trp Ile Asp Ala His Gln Ala Arg Val Leu  
35 40 45

Ile Gly Phe Glu Glu Asp Ile Leu Ile Val Ser Glu Gly Lys Met Ala  
50 55 60

Pro Phe Thr His Asp Phe Arg Lys Ala Gln Gln Arg Met Pro Ala Ile  
65 70 75 80

Pro Val Asn Ile His Ser Met Asn Phe Thr Trp Gln Ala Ala Gly Gln  
85 90 95

Ala Glu Tyr Phe Tyr Glu Phe Leu Ser Leu Arg Ser Leu Asp Lys Gly  
100 105 110

Ile Met Ala Asp Pro Thr Val Asn Val Pro Leu Leu Gly Thr Val Pro  
115 120 125

His Lys Ala Ser Val Val Gln Val Gly Phe Pro Cys Leu Gly Lys Gln  
130 135 140

Asp Gly Val Ala Ala Phe Glu Val Asn Val Ile Val Met Asn Ser Glu  
145 150 155 160

Gly Asn Thr Ile Leu Arg Thr Pro Gln Asn Ala Ile Phe Phe Lys Thr  
165 170 175

Cys Gln Gln Ala Glu Cys Pro Gly Gly Cys Arg Asn Gly Gly Phe Cys  
180 185 190

Asn Glu Arg Arg Val Cys Glu Cys Pro Asp Gly Phe Tyr Gly Pro His  
195 200 205

Cys Glu Lys Ala Leu Cys Ile Pro Arg Cys Met Asn Gly Gly Leu Cys  
210 215 220

Val Thr Pro Gly Phe Cys Ile Cys Pro Pro Gly Phe Tyr Gly Val Asn  
225 230 235 240

Cys Asp Lys Val Asn Cys Ser Thr Thr Cys Phe Asn Gly Gly Thr Cys  
245 250 255

Phe Tyr Pro Gly Lys Cys Ile Cys Pro Pro Gly Leu Glu Gly Glu Gln  
260 265 270

Cys Glu Leu Ser Lys Cys Pro Gln Pro Cys Arg Asn Gly Gly Lys Cys  
275 280 285

Ile Gly Lys Ser Lys Cys Lys Cys Pro Lys Gly Tyr Gln Gly Asp Leu  
290 295 300

Cys Ser Lys Pro Val Cys Glu Pro Gly Cys Gly Ala His Gly Thr Cys  
305 310 315 320

His Glu Pro Asn Lys Cys Gln Cys Arg Glu Gly Trp His Gly Arg His  
325 330 335

Cys Asn Lys Arg Tyr Gly Ala Ser Leu Met His Ala Pro Arg Pro Ala  
340 345 350

Gly Ala Gly Leu Glu Arg His Thr Pro Ser Leu Lys Lys Ala Glu Asp  
355 360 365

Arg Arg Asp Pro Pro Glu Ser Asn Tyr Ile Trp  
370 375

<210> 20

<211> 1140

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Artificial  
Sequence

<400> 20

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tacgagttcc tgtctctgcy ctccctggat aaaggcatca tggcagatcc aactgtcaat 360
gtccctttgc tgggaacagt gcctcacaag gcatcagttg ttcaagttgg tttcccgtgt 420
ctcggcaaac aagacgggt agcagcattt gaagtgaatg tgattgtcat gaattctgaa 480
ggcaacacca tccttaggac ccctcagaat gccatcttct ttaaaacatg tcaacaagct 540
```

```

gagtgtcccg gaggtgtcg aaatggaggc ttttgtaacg aaaggcgggt ctgcgagtgt 600
ccgatgggt tctacgggcc tctactgtgag aaagccctgt gcataccccg atgtatgaac 660
gggtgtctgt gtgtcactcc tggcttctgc atctgcccc ctggattcta cgggtgtcaac 720
tgtgacaaag caaactgctc aaccacctgc tttaatggag ggacctgctt ttaccgga 780
aaatgtatatt gccctcctgg actcgaggga gatcagtgtg aactcagcaa atgccccaa 840
ccctgccgaa atggaggtaa atgcattggt aaaagcaagt gtaagtgcc gaaaggttac 900
caaggagacc tgtgtcttaa gcccgctctgc gagcctggct gtggtgccca cggaacctgc 960
cacgaacca acaagtgcc gtgtcgagag ggctggcacg gcagacactg caataagagg 1020
tatggagcca gcctcatgca tgccccgagg ccagcaggcg ccgggctgga gcgacacacg 1080
ccttcactta aaaaggctga ggatagaagg gatccacctg aatccaatta catctggtga 1140

```

<210> 21

<211> 379

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Artificial  
Sequence

<400> 21

```

Met Ala Arg Arg Arg Ala Phe Pro Ala Phe Ala Leu Arg Leu Trp Ser
 1             5             10             15

```

```

Ile Leu Pro Cys Leu Leu Leu Leu Arg Ala Asp Ala Gly Gln Pro Pro
          20             25             30

```

```

Glu Glu Ser Leu Tyr Leu Trp Ile Asp Ala His Gln Ala Arg Val Leu
          35             40             45

```

```

Ile Gly Phe Glu Glu Asp Ile Leu Ile Val Ser Glu Gly Lys Met Ala
          50             55             60

```

```

Pro Phe Thr His Asp Phe Arg Lys Ala Gln Gln Arg Met Pro Ala Ile
          65             70             75             80

```

```

Pro Val Asn Ile His Ser Met Asn Phe Thr Trp Gln Ala Ala Gly Gln
          85             90             95

```

```

Ala Glu Tyr Phe Tyr Glu Phe Leu Ser Leu Arg Ser Leu Asp Lys Gly
          100             105             110

```

```

Ile Met Ala Asp Pro Thr Val Asn Val Pro Leu Leu Gly Thr Val Pro
          115             120             125

```

```

His Lys Ala Ser Val Val Gln Val Gly Phe Pro Cys Leu Gly Lys Gln
          130             135             140

```

```

Asp Gly Val Ala Ala Phe Glu Val Asn Val Ile Val Met Asn Ser Glu
          145             150             155             160

```

```

Gly Asn Thr Ile Leu Arg Thr Pro Gln Asn Ala Ile Phe Phe Lys Thr
          165             170             175

```

Cys Gln Gln Ala Glu Cys Pro Gly Gly Cys Arg Asn Gly Gly Phe Cys  
                   180                  185                  190

Asn Glu Arg Arg Val Cys Glu Cys Pro Asp Gly Phe Tyr Gly Pro His  
                   195                  200                  205

Cys Glu Lys Ala Leu Cys Ile Pro Arg Cys Met Asn Gly Gly Leu Cys  
                   210                  215                  220

Val Thr Pro Gly Phe Cys Ile Cys Pro Pro Gly Phe Tyr Gly Val Asn  
                   225                  230                  235                  240

Cys Asp Lys Ala Asn Cys Ser Thr Thr Cys Phe Asn Gly Gly Thr Cys  
                   245                  250                  255

Phe Tyr Pro Gly Lys Cys Ile Cys Pro Pro Gly Leu Glu Gly Asp Gln  
                   260                  265                  270

Cys Glu Leu Ser Lys Cys Pro Gln Pro Cys Arg Asn Gly Gly Lys Cys  
                   275                  280                  285

Ile Gly Lys Ser Lys Cys Lys Cys Pro Lys Gly Tyr Gln Gly Asp Leu  
                   290                  295                  300

Cys Ser Lys Pro Val Cys Glu Pro Gly Cys Gly Ala His Gly Thr Cys  
                   305                  310                  315                  320

His Glu Pro Asn Lys Cys Gln Cys Arg Glu Gly Trp His Gly Arg His  
                   325                  330                  335

Cys Asn Lys Arg Tyr Gly Ala Ser Leu Met His Ala Pro Arg Pro Ala  
                   340                  345                  350

Gly Ala Gly Leu Glu Arg His Thr Pro Ser Leu Lys Lys Ala Glu Asp  
                   355                  360                  365

Arg Arg Asp Pro Pro Glu Ser Asn Tyr Ile Trp  
                   370                  375

<210> 22

<211> 558

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Artificial  
                   Sequence

<400> 22

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 ctgctcctgc tgcgagcgga tgcagggcag ccacctgagg agagcttgta cctgtggatc 120  
 gacgcccatc aggctagagt gctcatagga tttgaagaag acattctgat tgtctcggag 180

```

gggaaaatgg ccccttttac acatgatttc aggaaagccc aacaaagaat gccagccatt 240
cctgtcaata tccactccat gaattttacc tggcaagctg cggggcaggc agaatacttc 300
tacgagttcc tgtctctgcg ctccctggat aaaggcatca tggcagatcc aactgtcaat 360
gtccctttgc tgggaacagt gcctcacaag gcatcagttg ttcaagttgg tttcccgtgt 420
ctcggcaaac aagacggggt agcagcattt gaagtgaatg tgattgtcat gaattctgaa 480
ggcaacacca tccttaggac ccctcagaat gccatcttct ttaaaacaca gctagcccat 540
catcatcatc atcattga                                     558

```

<210> 23

<211> 185

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Artificial  
Sequence

<400> 23

```

Met Ala Arg Arg Arg Ala Phe Pro Ala Phe Ala Leu Arg Leu Trp Ser
  1              5              10              15

```

```

Ile Leu Pro Cys Leu Leu Leu Leu Arg Ala Asp Ala Gly Gln Pro Pro
          20              25              30

```

```

Glu Glu Ser Leu Tyr Leu Trp Ile Asp Ala His Gln Ala Arg Val Leu
      35              40              45

```

```

Ile Gly Phe Glu Glu Asp Ile Leu Ile Val Ser Glu Gly Lys Met Ala
      50              55              60

```

```

Pro Phe Thr His Asp Phe Arg Lys Ala Gln Gln Arg Met Pro Ala Ile
      65              70              75              80

```

```

Pro Val Asn Ile His Ser Met Asn Phe Thr Trp Gln Ala Ala Gly Gln
          85              90              95

```

```

Ala Glu Tyr Phe Tyr Glu Phe Leu Ser Leu Arg Ser Leu Asp Lys Gly
      100              105              110

```

```

Ile Met Ala Asp Pro Thr Val Asn Val Pro Leu Leu Gly Thr Val Pro
      115              120              125

```

```

His Lys Ala Ser Val Val Gln Val Gly Phe Pro Cys Leu Gly Lys Gln
      130              135              140

```

```

Asp Gly Val Ala Ala Phe Glu Val Asn Val Ile Val Met Asn Ser Glu
      145              150              155              160

```

```

Gly Asn Thr Ile Leu Arg Thr Pro Gln Asn Ala Ile Phe Phe Lys Thr
      165              170              175

```

```

Gln Leu Ala His His His His His His
      180              185

```

<210> 24  
 <211> 717  
 <212> DNA  
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Artificial  
 Sequence

<400> 24

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ttttgtaacg aaaggcgggt ctgcgagtgt ccggatgggt tctacgggcc tctactgtgag 180
aaagccctgt gcatacccg atgtatgaac ggtggtctgt gtgtcactcc tggcttctgc 240
atctgcccc ctggattcta cgggtgtcaac tgtgacaaag caaactgctc aaccacctgc 300
tttaatggag ggacctgctt ttaccggga aaatgtattt gccctcctgg actcgaggga 360
gagcagtgtg aactcagcaa atgccccaa ccctgccgaa atggaggtaa atgcattggt 420
aaaagcaagt gtaagtgcc gaaagggttac caaggagacc tgtgctctaa gcccgctctgc 480
gagcctggct gtggtgcccc cggaacctgc cacgaacca acaagtgcc gtgtcgagag 540
ggctggcacg gcagacactg caataagagg tatggagcca gcctcatgca tgccccgagg 600
ccagcaggcg ccgggctgga gcgacacacg ctttactta aaaaggctga ggatagaagg 660
gatccacctg aatccaatta catctggcag ctagcccatc atcatcatca tcattga 717

```

<210> 25  
 <211> 238  
 <212> PRT  
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Artificial  
 Sequence

<400> 25

```

Met Ala Arg Arg Arg Ala Phe Pro Ala Phe Ala Leu Arg Leu Trp Ser
  1           5           10           15

Ile Leu Pro Cys Leu Leu Leu Leu Leu Asp Cys Gln Gln Ala Glu Cys
      20           25           30

Pro Gly Gly Cys Arg Asn Gly Gly Phe Cys Asn Glu Arg Arg Val Cys
      35           40           45

Glu Cys Pro Asp Gly Phe Tyr Gly Pro His Cys Glu Lys Ala Leu Cys
      50           55           60

Ile Pro Arg Cys Met Asn Gly Gly Leu Cys Val Thr Pro Gly Phe Cys
      65           70           75           80

Ile Cys Pro Pro Gly Phe Tyr Gly Val Asn Cys Asp Lys Ala Asn Cys
      85           90           95

```

Ser Thr Thr Cys Phe Asn Gly Gly Thr Cys Phe Tyr Pro Gly Lys Cys  
 100 105 110  
 Ile Cys Pro Pro Gly Leu Glu Gly Glu Gln Cys Glu Leu Ser Lys Cys  
 115 120 125  
 Pro Gln Pro Cys Arg Asn Gly Gly Lys Cys Ile Gly Lys Ser Lys Cys  
 130 135 140  
 Lys Cys Pro Lys Gly Tyr Gln Gly Asp Leu Cys Ser Lys Pro Val Cys  
 145 150 155 160  
 Glu Pro Gly Cys Gly Ala His Gly Thr Cys His Glu Pro Asn Lys Cys  
 165 170 175  
 Gln Cys Arg Glu Gly Trp His Gly Arg His Cys Asn Lys Arg Tyr Gly  
 180 185 190  
 Ala Ser Leu Met His Ala Pro Arg Pro Ala Gly Ala Gly Leu Glu Arg  
 195 200 205  
 His Thr Pro Ser Leu Lys Lys Ala Glu Asp Arg Arg Asp Pro Pro Glu  
 210 215 220  
 Ser Asn Tyr Ile Trp Gln Leu Ala His His His His His His  
 225 230 235

<210> 26  
 <211> 32  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> WIF-1 repeat

<221> VARIANT  
 <222> 2, 3, 4, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 18, 20, 21,  
 22, 23, 24, 25, 26, 27, 29, 30, 31, 32  
 <223> Xaa = Any Amino Acid

<400> 26  
 Cys Xaa Xaa Xaa Cys Xaa Xaa Xaa Xaa Xaa Cys Xaa Xaa Xaa Xaa Xaa  
 1 5 10 15  
 Cys Xaa Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Cys Xaa Xaa Xaa Xaa  
 20 25 30

<210> 27  
 <211> 36  
 <212> PRT  
 <213> UNKNOWN

<220>



<221> VARIANT

<223> Xaa = Any Amino Acid

Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Cys Xaa Xaa Xaa Xaa Cys Xaa Xaa  
1 5 10 15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Cys Xaa Cys Xaa Xaa Xaa Xaa Xaa  
20 25 30  
Xaa Xaa Xaa Cys  
35